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ABSTRACT

This paper discusses the use of tools that allow the development and presentation of time- and place-independent courseware. Such tools make the Internet another valuable delivery method for distance education courses. The use of the tools is discussed in relationship to a course currently being offered at the Community College of Southern Nevada that prepares students to take and pass an industry recognized certification test. Lessons learned and emerging guidelines are outlined. The development of the model required a large number of new software packages and hardware. Development of this project confirmed that there are disadvantages associated with distance education modules. There was not one specific software package available to create the required media offerings. The learning curve of instructors can be alleviated using mentoring, so that instructors who have developed modules can help novices to understand and use the hardware and software tools available for distance education development. (Contains 11 references.) (AEF)

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Towards More Independent Learning: A Southern Nevada Perspective

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Abstract: This paper discusses the use of tools that allow the development and presentation of time and place-independent courseware. Such tools make the Internet another valuable delivery method for distance education courses. The use of the tools is discussed in relationship to a course currently being offered at the Community College of Southern Nevada that prepares students to take and pass an industry recognised certification test.

Introduction

The Community College of Southern Nevada (CCSN) is responsible for delivering educational opportunities to a 45,000 square mile area in Southern Nevada. Enrolment at CCSN was approximately 36,000 students for the fall semester 2000 (September through December 2000). To meet the need of so many students, CCSN has built five major and over a dozen outreach campuses. Many students however, are still not able to take classes due to working schedules or distance from one of the campuses.

A continuing option for students who are unable to attend normal classroom instruction has always been distance education (DE). The increased availability and power of computers has created distance education possibilities not available just four years ago. But the use of these components is often sporadic, if they are used at all due to many factors including the cost of entry for the school (Matthews, 1999; Chambers, 1999, Barley, 1999) and possible higher costs for the student (Matthews, 1999; Barley, 1999; Blumenstyk and McCollum, 1999). Many of the distance education modules at CCSN are still delivered in a manner that requires students and instructors to meet at specific times for discussion, interaction and presentation. These modules offer students limited by distance the ability to take modules. However, for students with unusual or irregular work schedules or other time conflicts, such meetings are still constraining and the students may still be unable to take modules. For modules to offer students the two greatest advantages of distance education, modules must offer both time and place flexibility (Shave, 1998; Fender, 1999; Alexander, 1999).

An additional constraint is the lack of technology experience and knowledge that instructors have (Shave, 1998; Mudge, 1999). Technology improvements alone do not offer most instructors the ability to offer distance

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education modules unless they are familiar and comfortable with the technology (Shave, 1999; Alexander, 1999; Matthews, 1999; Carnevale, 1999; Trinkle, 1999; Grill, 1999; Mudge, 1999). In addition, instructors must have the time and patience to learn how to use the technology. This can include expanding the frame of reference an instructor has from classroom-based instruction to instruction that is independent of place and time. Many instructors find this difficult. The learning curve experienced by instructors can be partially alleviated by a good computer support department at the college or university. However, the use of outside providers can affect a faculty member's control over his or her intellectual property.

Delivery that is independent of time requires the creation of online courses that can be accessed at any time and place, as long as Internet access is available. In order to explore some of the issues involved in distance delivery a particular module was used as a test case. The module selected for use in the work described in this paper was Computer and Information Technology 106B. This module is a preparation course for students who are preparing to take the Computing Technology Industry Association's A+ Core certification test. This test is one of two tests required to become an A+ Certified PC Technician. In order for the module to be as close as possible to the actual on-campus presentation, streaming audio and video were selected so that the classroom lectures could be transmitted over the Internet. This type of technology does not require that files be downloaded before use. In addition, the use of streaming technology does not require specific class meeting times. This module required a means for grading and evaluating a student's knowledge acquisition as well as support options that are also independent of time and place. This does not mean the instructor must be available at all times, but that students have the ability to ask questions whenever the module is being accessed. Such support can be offered using email, voice mail, snail mail, and office visits.

Creating such modules is beyond the ability of many instructors, not necessarily because of ability, but due to time and knowledge constraints. Effective tools can make such development not only easier, but more realistic for non-technical instructors.

Development Process and Tools

Any module requires three components. First, the learning material that is covered needs to be disseminated. Second, communication between the instructor and student for questions and other feedback needs to be set up. Finally, learning must be evaluated and assessed. CCSN adopted a Web development tool set called WebCT. WebCT provides Internet-based tools for testing. While there is a learning curve with WebCT, the curve is similar to the learning curve of a new word processing program instead of a programming language. Once the tests are in place, students can receive immediate feedback after a test is submitted for grading.

A web site was developed to provide communication between the instructor and students. The web site could be used to post messages of concern for all students as well as contain an email link so that students could send the instructor an email during the module's delivery. Additional information could be added to the web site if needed. Students' learning is evaluated and assessed through four tests administered on demand through WebCT. The first three tests are not comprehensive. The fourth test is comprehensive with questions covering all of the learning material presented. The current web site (http://131.216.93.7) contains module syllabi, course information, textbook listings, and certification testing information.

The second and third components used one or two software packages to help facilitate their development. But that was not true with the first component. A number of different tools are needed to develop courseware for streaming. Each tool is required in order to finish with a file that the streaming server can transmit to students on demand. Each tool fits into the development process. The development process is a seven-step sequence. Each step in the sequence uses different tools to provide the needed result. The CIT 106B course was developed using the tools and process that are described below.

Step 1: Recording of lectures and video aspects

Microsoft PowerPoint was selected as the first tool due to its ability to record narration along with the PowerPoint slides. Other presentation software also has this ability, but the author was already familiar with PowerPoint. When narration is recorded, using a standard headset and microphone through the computer's sound card, PowerPoint stores the recorded sound in separate .wav files. One .wav file for

each slide. The .wav files are stored using sequential naming so that the order and slide to file relation is simple to follow. These files could be used for transmission over the Internet, but they are quite large and would require a complete download before being playable. In addition, there is no copyright protection for the files. For these reasons the second tool and step are necessary.

Step 2: Conversion of slides to jpg format
A tool is required to take the PowerPoint slides and convert them to a different graphic format (jpg). The new format requires less storage space and is optimised for Internet use. The tool selected was Paint Shop Pro 4. There are other tools available for use at sites like tucows.com and shareware.com. The only requirement is that the program has the ability to accept pasted objects and then save the object in jpg format.

Step 3: Combining of audio and video into a single file format
PowerPoint stores the slides and audio files as separate entities. A tool is required that can take the video slide, combine it with an audio file and create a single audio-visual file, using the avi format. The tool selected is DubIt. The first reason this program was selected was due to its free 30-day evaluation period. The first author was able to complete the conversion of the CIT 106B lectures in the trial period. The first author found the tool so helpful and useful that he purchased it. DubIt combines the slide and associated .wav file and then allows it to be saved as an avi file.

Step 4: Conversion of digitised data to stream data
The tool selected for this step was chosen due to the fact that Real Server was selected to stream the files. Real Systems has other tools available for download that help in the preparation of streaming files. RealProducer is a program that accepts avi files and then converts them to streaming files. The interface is quite understandable and easy to use. The program is free to download with most of the features enabled.

Step 5: Installation of Server software and storage of stream files
A Windows NT Server 4 machine was selected as the Real Server. The Real Server software was purchased and installed. The installation is straight forward and Real Systems provides good technical support if there are any questions during and after installation. Once the server is installed, the files generated in step 4 need to be copied to the selected directory. One important concept is file security. Only the desired amount of access should be granted to the individuals accessing the files. In most cases this would be the permission to read.

Step 6: Creation of front-end delivery site
This step required a great deal of work. The majority of the work was learning HTML for web creation purposes. The HTML editor used was HomeSite 4. The front-end delivery tool selected is Internet Information Server 4, a free add-on from Microsoft to the Windows NT Server 4 platform. Installation of the IIS 4 software is simple and not time consuming. IIS includes a sample Internet site that can be used as a guide for adding connections in step 7. Pages need to be designed that provide access to students.

Step 7: Connecting the front-end delivery site to the stream server and files
The software package used to connect the streaming files and the web site is WebCT, or Web Course Tools. WebCT simplifies the process by providing student management, test generation and offering tools, and grading. Links can be added from the website that provides logon access to the WebCT server. Links in the WebCT server pages connect the user to the Real server. A valuable aspect of WebCT is that the program is free to download and use for development. Licensing is only required when a module is available for student access. This allows an instructor the ability to create and view the module as well as test the various aspects of the presentation. It also provides a good evaluation opportunity for those who are still uncertain about the use of WebCT. If WebCT is used, the license fees are quite reasonable.

The CIT 106B module, developed using the above methodology can be viewed at http://webcampus.ccsn.nevada.edu. Select the "Logon to MyWebCT". The sample ID is tstudent and the

password is temp. All lectures will be available, but due to academic constraints, the module tests will not be available. The account above will be active during the EDMEDIA conference.

Lessons Learned and Emerging Guidelines

The development of the module required a large number of new software packages and hardware. The first author was already experienced with computer software and hardware as a senior systems analyst as well as holding certifications from Novell, Microsoft, and CompTIA. However, the amount of knowledge that had to be acquired was daunting. Developing a web-based or multimedia course requires a large amount of development time. The amount of time required can be discouraging for many instructors. If a large amount of time and effort is required, the resultant module needs to be usable for a good period of time. For instance, the British Open University plans courses to last for 8 years (Blumenstyk, 1999). Such a long time frame can be difficult when dealing with topics that change frequently. CompTIA has announced a major revision of the certification program of which the CIT 106B module is part. This will require a complete rewrite of the current module for use in the spring of 2001. The last revision of the certification content was made in 1998.

The development of this project confirmed that there are disadvantages associated with distance education modules, especially those mentioned in section one. A large amount of hardware is required for the creation and maintenance of a distance education module. In many cases it was difficult to procure the required equipment and the first author was required to purchase items so that the module could be created. In addition, the time spent learning the software and hardware was not reimbursed, in any manner, by the college. Many instructors are not willing to invest their own money and other resources to develop modules without reimbursement. Though some instructors might be willing to fund the development of the module so that they can retain ownership. However, if this investment includes items required to deliver the modules the institution benefits at the expense of the instructor.

There was not one specific software package available to create the required media offerings. Instead, one package was used for one part, another package for a second part, and then a requirement for additional software was identified when the shortcomings of the first packages were discovered. This created a steep learning curve for an experienced software engineer, not to mention instructors unfamiliar with the hardware and software required. But once an instructor learns the various hardware items and software packages, subsequent use for module development should not be as time and effort consuming. Some of the disadvantages of distance education are not controllable by the instructor, but rather must be addressed by the institution. This includes the cost of hardware and the support infrastructure required to offer distance education modules. However, institutions can start by offering a limited number of modules and then expand the offerings as demand increases. This will allow the budgeting of support items over a longer period of time.

The learning curve of instructors can be alleviated using mentoring. Instructors who have developed modules can help those who are inexperienced to understand and use the hardware and software tools available for distance education development. CCSN has addressed this issue by offering a number of workshops at the beginning of each semester, as well as others offered during the semester, as needs are identified, that help educate instructors in the use of the tools mentioned above.

Conclusions

The use of technology, along with various tools can make truly independent learning a reality. The offering of a module with time and place flexibility offers opportunity to students who otherwise would not be able to take advantage of higher education. Since the module is delivered via the Internet, learning can take place at home, while traveling, or at an institution's computer lab. The module can also be offered to students not normally included in an institution's audience; a global audience. This type of module offers self-paced study to the learner. Lectures can be repeated multiple times if a student is having difficulty grasping the subject. Something that is not possible in the normal class-room environment. We feel that the advantages associated with this type of distance education module are sufficient motivation to continue the development of more simular modules, with the second module available in Spring 2001.

However, although there are advantages to distance education, there are problems and concerns. The identified concerns must be addressed. Creation of the modules and the supporting web links is a time consuming process even for experienced designers. For normal staff, the time and effort required could seriously affect their other teaching and non-teaching assignments. Institutional support, or at the least, cross department co-operation, is required if such development and presentation options are used in more than isolated instances. Institution-wide tools need to be selected and faculty training provided. If an institution-wide standard is not created, training and support become very difficult, if not impossible. The institution-wide adoption of specific software and hardware platforms also ensures that modules developed and offered to students by different academic departments will be transparent to the students.

While this type of distance education module might not fit all disciplines, the ability to generate and offer such modules is in the reach of all instructors. Despite the technical concerns and instructor learning curve, we believe that the benefits associated with this type of distance education module for the college and the students far outweigh the negative aspects encountered to date. We are optimistic that our development plans for additional modules will provide educational opportunities to students that otherwise would not be able to improve their education.

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